

# NASA TECH BRIEF

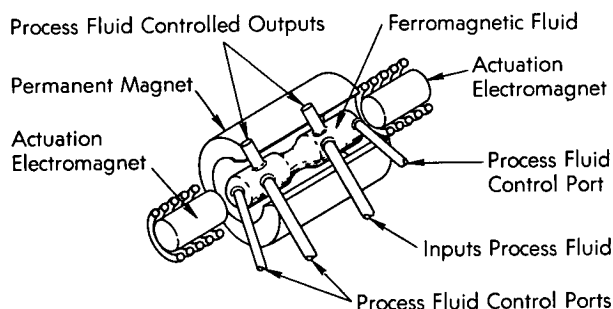
## *Ames Research Center*



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### Ferromagnetic-Fluid Logic Devices

The ferromagnetic-fluid logic element depicted schematically in the diagram utilizes the motion of a captive plug of ferromagnetic fluid to switch flows of low-pressure process-control fluid in fluidics assemblies. The field, sustained by the permanent magnet,



traps the ferromagnetic fluid and makes it cohesive so as to prevent its migration into the control channels. Electromagnets are used to move the ferromagnetic-fluid slug so as to open or close control-fluid channels and thus to provide the desired logic or valving function. It is also possible to move the slug with a process-fluid signal introduced axially to the slug's motion or by an overpressurization at one control port and a corresponding lowering of pressure at another. Thus, it is possible to operate the logic element both electrically and fluidically.

Logic elements of this type can be controlled by passing a permanent magnet or an electromagnet over them thus providing "proximity" switching functions similar to magnetic "reed" type switches; when operated in this way, a completely closed fluid logic system can be used to control machines or other devices. Because ferromagnetic fluids can be moved magnetically, the fluid control device described above can be considered to be more reliable than devices in which fluid flow is switched by mechanical means.

The device exhibits memory, for a short-duration electrical signal switches the ferromagnetic-fluid slug from one position to another.

#### Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer  
Ames Research Center  
Moffett Field, California 94035  
Reference: B72-10011

#### Patent status:

No patent action is contemplated by NASA.

Source: M. J. Makowski and  
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